

REMARKS

The claims in this application under examination are claims 1-14. Claim 1 has been amended without addition of new matter and the basis for the amendment to claim 1 is found in the specification at page 8, line 4 through page 9, line 10.

The rejection of claims 1-5 and 9 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-2 and 4 of U.S. Patent 6,218,569B1 is respectfully traversed. Accompanying this response is a terminal disclaimer which as noted by the Examiner may be used to overcome such a non-statutory double patenting ground of rejection in the case where both the patent forming the basis of the rejection and the current application are assigned to the same party.

The rejection of claims 1-5 and 9-14 under 35 U.S.C. § 102(b) as anticipated by Nakase (JP 10003169A) is respectfully traversed.

The cited references

Nakase discloses a photosensitive composition comprising a polymeric compound having an alicyclic structure substituted with at least one substituent selected from the OH group and the NO₂ group, or having a heterocycle at a side chain (claim 1). The typical compounds are exemplified on pages 6 to 13, and these

compounds correspond to the compound shown by the formula (2) of the present invention in the case where R¹ is a hydrogen atom, R³ is a methyl group, R⁴ is a hydrogen atom, methyl group, hydroxyl group, nitro group, or a carboxyl group, and Z is a cyclohexane ring, norbornane ring or adamantine ring. Moreover, in Nakase, the photosensitive compositions containing these compounds have excellent resolution, sensitivity and dry etching resistance, and resistance to cracking and peeling from a substrate.

The rejection of claims 1-2, 4, 7 and 10-14 under 35 U.S.C. § 102(b) as being anticipated by Takechi (EP 663616A2) is respectfully traversed.

Takechi discloses the specific copolymer having an alicyclic group (claim 1). The monomer constituting the typical copolymers correspond to the compound shown by the formula (2) of the present invention in the case where R¹ is a hydrogen atom, R³ is a hydrogen atom or a methyl group, R⁴ is a hydrogen atom, or a methyl group, and Z is a norbornane ring or an adamantine ring. The copolymer has not only good transparency and etching resistance but also high sensitivity and adhesion (page 1, lines 40 to 41).

The rejection of claims 1-5, and 9-14 under 35 U.S.C. § 102(e) as being anticipated by Hada (US 5929271A) is respectfully traversed.

Hada discloses 2-hydroxy-3-pinane (meth)acrylate (claims 1 and 2). These compounds correspond to the compound shown by the formula(2) of the present invention in the case where R^1 is C_{1-4} alkyl group, R^3 is a hydrogen atom or a methyl group, R^4 is a hydrogen atom, C_{1-4} alkyl group, or oxo group, and Z is bicyclo[3.1.1]heptanone (pinanone ring). These compounds have excellent dry etching resistance, and adhesion to a substrate (column 2, lines 30 to 33).

The rejection of claims 1-2, 4-8, 10-14 under 35 U.S.C. § 102(a) as anticipated by Hiroto (JP 11109632A) is respectfully traversed.

Hiroto discloses a radiation sensitive material containing a resin having a polar group-containing an alicyclic functional group and a functional group from which an alkali-soluble group is formed by an acid in one molecule which generates the acid when irradiated (claim 1). The compounds constituting the resin correspond to the compound shown by the formula (2) of the present invention in the case where R^1 is a hydrogen atom, R^3 is a hydrogen atom, R^4 is a hydroxyl group, and Z is a norbornane ring or an adamantine ring. The material has excellent dry etching resistance, adhesion and sensitivity (column 4, lines 26 to 31).

Incidentally, it should be noted that Hiroto was published (April 23, 1999) which is after the priority date of the present

application, (May 25 and August 28, 1998) and thus, Hiroto is no believed to constitute prior art. If necessary, applicant stands ready to furnish a sworn translation of the priority documents for the present application.

The comparison of the present invention and the cited references

It is respectfully urged that all of the cited references fail to disclose or suggest (either alone or in combination) an acid-responsive compound shown by the formulae (1) and (2) having the specific structure (especially the specific ring Z). Therefore, the subject matter of the present invention is novel in the light of the cited references.

Incidentally, Nakase and Takechi disclose the compounds wherein the group corresponding to R^2 of the formula (2) is a hydrogen atom. That is, the compounds of Nakase and Takechi do not have any steric hindrance between the ring and (meth) acryloyl group, and Nakase and Takechi are silent on such steric hindrance. Moreover, since Hada discloses the (meth)acrylic acid ester of hydroxy bicyclo[3.1.1]heptane, the compound of Hada does not have the specific ring corresponding to the formula (2). Further, Hada is silent on the significance of the specific ring and its polar substituent. Accordingly, the specific compounds of the formula (1) and (2) would not be predicted from the cited references. Nor,

would a skilled artisan be led to the presently claimed compounds, since according to the present invention the specific compounds of the formulas (1) and (2) have not only steric hindrance between the ring and the (meth)acryloyl group, but also the specific ring and its polar substituent, the ring Z (i.e., alicyclic hydrocarbon group) is stably and efficiently eliminated from the polymer by the acid formed from the acid precursor on exposure to light to thereby enable water or alkali development. Moreover, such compounds show high adhesion to a substrate and are unexpectedly useful for forming a fine-line resist pattern with high precision and high reproducibility. Thus, these effects of the present invention would not be obvious or predicted from the cited references.

Accordingly, it is believed that the subject matter of the present claims is novel and unobvious in the light of the cited references. Therefore, reconsideration and allowance of the present application is respectfully solicited.

Should the Examiner wish to contact applicant's representative she may telephone the undersigned at the number in the Washington area listed below in order to arrange an interview to advance the prosecution of this application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees

required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

Respectfully submitted,

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RCS/EHV/jms
2224-0163P

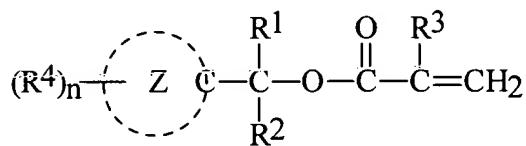
P.O. Box 747
Falls Church, VA 22040-0747
(703) 205-8000

Attachment: Version with Markings to Show Changes Made

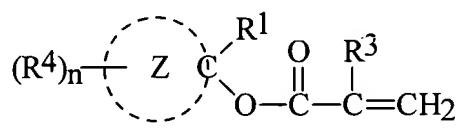
VERSION WITH MARKINGS TO SHOW CHANGES MADEIn the Claims:

Please amend claim 1 as follows:

1. (Amended) An acid-responsive compound represented by the following formula (1) or (2)



(1)



(2)

wherein R^1 and R^2 are the same or different from each other and each represents a hydrogen atom, an alkyl group or a cycloalkyl group; R^3 represents a hydrogen atom or a methyl group; R^4 represents a hydrogen atom, a halogen atom, an alkyl group, an oxygen-containing group, an amino group or an N-substituted amino group; n represents an integer of not less than 1; with proviso that all R^4 's are not concurrently hydrogen atoms, and R^4 may be [vary] varied according to n ; the Z ring represents a monocyclic or polycyclic alicyclic hydrocarbon ring; in formula (1), R^1 and R^2 may, jointly and together with the adjacent carbon atom, form an alicyclic hydrocarbon ring,

provided that the acid-responsive compound is the compound represented by the formula (2), R¹ represents an alkyl group or a cycloalkyl group and Z represents a monocyclic or polycyclic alicyclic hydrocarbon ring selected from the group consisting of cycloalkanes, spiro hydrocarbon rings, ring assembly hydrocarbon rings, fused-ring hydrocarbon rings, and bridged rings,

Wherein the bridged ring is selected from the group consisting of tricyclic hydrocarbon rings, tetracyclic hydrocarbon rings and hydrogenated dimers or dienes.